

SPECIAL SPECIFICATION

SECTION 01111-S

CLEANROOM SPECIAL CONSTRUCTION AND CLEANING PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section includes:

1. Special Construction Procedures
2. General Cleaning Procedures
3. Special (Clean Room) Cleaning Procedures

1.02 REFERENCES/PROJECT REQUIREMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1. Section 01110S – Clean Construction Protocol
2. Section 01112S – Cleanroom Certification And Acceptance
3. Section 13037S– Cleanroom Access Flooring
4. Section 13036S – Cleanroom Wall System
5. Section 13020S– Cleanroom Ceiling System

1.03 DEFINITIONS

A. Stages of Construction Cleanliness: Defined as clean stages in construction schedule where cleaning requirements in building are more stringent and type and methods of work are more restrictive.

1. Normal Clean.

2. Very Clean.
 3. Ultra Clean.
- B. Thorough Clean Up: Defined as three passes starting at ceiling level and working down to the subfab level.
- C. Cleanroom Protocol: Defined as the philosophy of clean construction and the commitment to following the Procedures outlined in this section.

1.04 SUBMITTALS

- A. Submit the following in accordance with Conditions of Contract and Section 01300.

1.05 QUALITY ASSURANCE

- A. Contractor to provide a quality assurance manual to the owner for approval. Upon approval, contractor shall execute quality assurance procedures.

1.06 PROJECT/SITE CONDITIONS OR SPECIAL CONDITION

- A. Refer to Specification 01110S for activities during each protocol stage.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 APPLICATION

3.02 CLEANING

A. GENERAL

1. The tasks of the cleaning contractor are described as follows:
 - a. Responsible for maintaining cleanliness in the Microfab building at the beginning of the very clean stage.

- b. Responsible for maintaining and securing all entrances to the building also at the beginning of the very clean stage. At this time the civil contractor shall have completed all "normal clean" stage items under his scope of work.
- c. Provide all equipment, materials, and manpower required to maintain the building clean.
- d. Supply trash containers throughout the fab building and emptied regularly as required.

B. NORMAL CLEAN STAGE

- 1. Conduct cleaning and non-hazardous, non-toxic waste disposal operations in compliance with local laws and ordinances. Comply with federal and local environmental and anti-pollution regulations.
- 2. Complete the following cleaning operations:
 - a. Remove tools, construction equipment, machinery and surplus material from the building.
 - b. Remove waste material and rubbish from MiroFab bldg.
 - c. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - d. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
 - e. Broom clean concrete floors in unoccupied spaces.
 - f. Vacuum clean carpet and similar soft surfaces, removing debris and excess nap. Shampoo if required.
 - g. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - h. Remove labels that are not permanent.

- i. Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that can not be satisfactorily repaired or restored, or that show evidence of repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical name- plates.
 - j. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
 - k. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - l. Replace air disposable filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - m. Clean light fixtures, lamps, globes and reflectors to function with full efficiency. Replace burned out bulbs and defective and noisy starters in fluorescent and mercury vapor fixtures.
 - n. Leave the Project clean and ready for occupancy.
3. Remove temporary protection and facilities installed during construction to protect previously completed installations during the remainder of construction period.

C. VERY CLEAN STAGE

1. At the start of the very clean stage a thorough cleaning of the facility should be performed starting at the ceiling level and working down to the subfab level.

<u>Items</u>	<u>Job description</u>
Steel structure	Vacuum and wipe clean
Hepa filter support	Vacuum and wipe clean
Return air shafts	Vacuum
First floor	Vacuum
Pipe rack	Wipe clean
Waffle table	Vacuum and wipe clean
Floor	Scrub clean floor
Other fixtures	Wipe clean

Support areas	Vacuum and wipe clean
Stairwells	Vacuum
Utility area	Vacuum
Sprinkler mains	Vacuum and wipe clean
Perimeter aisle	Vacuum

2. Daily Cleaning Routine:

- a. Vacuum floor with dry vacuum cleaner at least twice daily.
 - b. Removal of waste from waste containers at least three times daily.
 - c. Spot clean glass panels to remove finger marks and stains.
 - d. Spot clean wall to remove stains.
 - e. Spot mop floor with solution of chemical as and when necessary.
3. Full time protocol workers will keep the entrances clean and inform the workers and visitors about the clean construction requirements.
 4. Prohibit entrance to the building for staff, which show repeatedly or serious irregular behavior.
 5. Cleaning material will be available at the entrances for the workers to wipe down materials before transportation inside the building.
 6. Shoe racks are provided at the entrances.
 7. During the very clean stage materials will unpacked in designated areas. The materials are wiped down in the entrance area.
 8. This entrance will also act as air-locks to keep the building with positive pressure, i.e. they are relatively sealed.
 9. Special attention will be paid to the housekeeping, to keep the working area in the whole fab safe, neat and clean.
 10. The passenger and material traffic are allowed on the controlled accesses and traffic ways only. There will be only three entrances.

11. Weekly and random surveys for cleanliness will be conducted throughout the building construction.

D. ULTRA CLEAN STAGE

1. At the start of the ultra clean stage again a thorough cleaning of the facility should be performed starting at the ceiling level and working down to the subfab level.

<u>Items</u>	<u>Job Description</u>
Repeat all items of first cleaning	
Return air shafts	Vacuum and wipe clean
Filter ceiling grid	Vacuum and wipe clean
Raised floor	Vacuum and wipe clean
Make up air units and ductwork	Vacuum and wipe clean
Lighting fixtures	Wipe clean
Sprinkler piping	Wipe clean
Plenum partitions	Wipe clean
Piping	Wipe clean
Exhaust ducts and piping	Vacuum and wipe clean
Support area and chemical dock	Vacuum and wipe clean
Walls	Wipe clean
Perimeter aisle	Vacuum and wipe clean
Labs	Vacuum and wipe clean
Entrances	Vacuum and wipe clean
Stairwells	Vacuum and wipe clean

2. Daily Cleaning Routine:
 - a. Cleaners are to use the Hepa Vacuum cleaner to remove heavier than air particle matter, such particle matter is too heavy to be swept from the room by air treatment system (twice a day).
 - b. All wet cleaning will be accompanied with the use of a 10% IPA/DI water solution within the cleanroom to reduce ionic contamination brought into the area by unfiltered water.
 - c. Use sticky roller to remove particle matter. Such particles are solidly deposited on the floor and cannot be removed by vacuum cleaner (twice a day).
 - d. Collect the waste material from the cleanroom area and dispose of it in the designated containers (three times daily).

- e. Vacuum cleaner brush and attachment will be inspected and cleaned outside the cleanroom to prevent contamination within the cleanroom area.
 - f. Spot clean glass and wall panels with Crew 2 wiper and 10% IPA/DI water solution.
 - g. All incoming material filter, blanks, must be cleaned again just before installation.
3. Weekly Cleaning Routine:
- a. All glass panels, walls will be wiped with Crew 2 Wiper using cleanroom detergent and dilute with DI water (according to Manufacturing Specification).
 - b. All doors, partition walls, cabinet top and equipment top will be wiped with Crew 2 Wiper using cleanroom detergent diluted with DI water (according to cleaning procedures specification).
 - c. Thorough washing of waste container, such cleaning should be done outside the cleanroom area.
4. Full time protocol workers keep the entrances clean and inform the workers and visitors about the clean construction requirements, which are valid for the ultra-clean stage.
5. Prohibit entrance to the building of staff, which show repeatedly or serious irregular behavior.
6. Materials for the interior of the building will arrive on-site individually packed.
7. Before entering into the ultra clean area following general procedure of cleaning the material will be used:
- a. The materials will be unpacked outside the building in a designated entrance area. This entrance will also act as air-locks to keep the building with positive pressure, i.e. they are relatively sealed. The outer box will be removed into trash containers. The material will be wiped down in the designated entrance area.
 - b. For filters and blanks the polyethylene plastic bags will be removed in steps according to the temporary working place storage and final clean/quality check just before installation. Special attention will be paid to the housekeeping, to keep the working area in the whole fab safe, neat and clean.
 - c. Components, which arrive not in clean condition, are cleaned with humid cloths or vacuum cleaner before the assembly.

8. The passenger and material traffic is only allowed via air locks. See section 01110S for Gowning Procedures. Sticky tacky mats are installed at the entries to the clean areas. Humid wiping is the preferred cleaning method using 10% IPA/DI water solution. Surfaces are treated either with an anti-static or blown off with ionized, very fine filtered compressed air.
9. Just before the end of the ultra clean stage the cleaning is performed according to the procedures, which will be used during cleanroom operation. An example of a frequency chart is given below:

Item	Method	Cleaning Frequency
dychem flooring	wet mop and vacuum	every hour, on-going
baseboards	scrub	weekly or at QA request
floor grates	damp wipe	daily
air vents	vacuum	weekly
door jambs	damp wipe	daily
mats	wet mop	twice a day
plenums	wet mop and vacuum	daily
steel work, pipe racks	damp wipe and vacuum	daily

10. The cleaning operations shall be documented continuously during all stages of construction.

END OF SECTION